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High-Resolution Isotopic, Geophysical and Biomarker Records of Aptian-Albian Oceanic Anoxic Events at Deep Sea Drilling Project Site 398, North Atlantic Ocean

Montañez, Isabel1, Finkelstein, David2, Bralower, Tim3, Li, Yongxiang3, and Osleger, David1

1Dept. of Geology, University of California, Davis, CA 95616, USA

2Dept. of Geological Sciences, Indiana University, Bloomington, IN 47405, USA

3Dept. of Geosciences, Pennsylvania State University, University Park, PA 16802, USA

A high-resolution and expanded record of Oceanic Anoxic Events (OAE) in the early Aptian (OAE1a; 120 Ma) and latest Aptian-early Albian (OAE1b; 112Ma) were recovered at Deep Sea Drilling Project Site 398 on Vigo Seamount in the North Atlantic Ocean. The OAEs are recognized by minor increases in organic carbon content (up to 2 wt% TOC) and characteristic carbon isotopic variations including a short-term 4-5‰ shift to negative values followed by a longer term 2-3‰ shift to more positive values. The Aptian and Albian section contains abundant intercalated coarse siltstone and sandstone horizons often with inclined lamination. These horizons indicate that hemipelagic sedimentation at Site 398 was interrupted periodically by turbidite deposition.

Here we present continuous dm-scale records of grain size distributions (0.5 to 900 μm), wt% TOC, C/N ratios, $\delta^{13}C_{org}$, $\delta^{15}N_{org}$, magnetic susceptibility and anhysteretic remanent magnetization measurements as well as biomarker analyses of select stratigraphic intervals of OAE1a and 1b. Grain size and nannofossil abundance show no significant relationships with TOC, $\delta^{13}C_{org}$and $\delta^{15}N_{org}$ over short-term intervals as well as across the OAEs indicating that the high-resolution Aptian-Albian isotopic, geochemical and geophysical proxy records at Site 398 are hemipelagic signals and are not influenced by redeposition in turbidity currents. Isotopic and TOC records

show significant and systematic variation throughout both OAEs. C and N isotopes are decoupled through OAE1a, whereas they are generally coupled through OAE1b. For OAE1a, TOC shows a strong positive correlation with C/N ratios and an inverse correlation with $\delta^{15}N_{org}$ likely recording the increased flux of terrestrial plant matter to intervals of high TOC. The n-C_{17}/n-C_{29} ratio indicates systematic fluctuations in the contribution of marine algal and terrestrial leaf wax n-alkanes likely in response to changes in rates of sedimentation and/or algal productivity. The algal fraction dominates the C2 and C5 segments of OAE1a, relative to older or younger intervals. Long-chain n-alkanes show a strong odd/even preference despite the absence of woody or structured terrestrial organic matter. Consequently, the terrestrial leaf waxes are inferred to derive from input of eolian dust and associated strong winds and arid-climate on the up-wind landmass during OAE1a.

These initial results indicate that Site 398 deposits on Vigo Seamount in the North Atlantic Ocean hold promise for refining phase relationships between geochemical and isotopic proxies throughout OAE1a and OAE1b, and in turn the mechanics of addition of light carbon to the ocean-atmosphere system during these events.